California Department of Pesticide Regulation
Environmental Hazards Assessment Program
1020 N Street
Sacramento, California 95814

STANDARD OPERATING PROCEDURE
Equal-Width-Increment Sampling of Surface Waters

KEY WORDS

Field sampling; water quality; discharge; contamination

APPROVALS

APPROVED BY: _____ DATE: 2/13/98
Management

APPROVED BY: _____ DATE: 2/5/98
EHAP Senior Scientist

APPROVED BY: _____ DATE: 2/9/98
EHAP Quality Assurance Officer

PREPARED BY: Kevin P. Bennett DATE: 2/5/98

Environmental Hazards Assessment Program (EHAP) organization and personnel such as management, senior scientist, quality assurance officer, project leader, etc. are defined and discussed in SOP ADMN002.

1.0 INTRODUCTION

1.1 Purpose

This Standard Operation Procedure (SOP) discusses the specific procedure for sampling surface water using the equal-width-increment (EWI) method. A cross-sectional depth-integrated sample obtained by the EWI method gives a sample volume proportional to the amount of flow at each of several equally spaced verticals in the cross section. This document gives instruction on A) determining the number of verticals, B) determining a transit rate, and C) collection of a sample volume.

1.2 Definitions

In the context of this SOP, surface water is defined as all inland waters, excluding groundwater, which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife.

2.0 MATERIALS

2.0.1 D-77 Sampling Unit
2.0.2 Bridge Board/Crane and Reel
2.0.3 5/16" Nozzle/Cap Assembly
2.0.4 3-liter Teflon® Bottle
2.0.5 Tag-line or Tape Measurer
2.0.6 Composite Sample Container

3.0 PROCEDURES

Instructions included here are modified from the following document: Edwards, T.K. and D.G. Glysson. Field Methods for Measurement of Fluvial Sediment, U.S. Geological Survey Open-File Report 86-531. pp. 61-64.

3.1 Number of Verticals

3.1.1 Looking downstream, measure the perpendicular distance from the left edge of water to the right edge of water.

3.1.2 Visually inspect the stream from bank to bank, observing the velocity and depth distribution as well as apparent distribution of sediment in the cross section.

3.1.3 Determine the size of the interval that represents approximately 10% of the flow at that part of the cross section where the "unit width discharge" is highest (generally the deepest, fastest section). This increment must be used for the entire cross section. Typically, this works out to be from 10 to 20 increments for streams 5 feet wide.

3.1.4 For example, if the stream width determined from the tag-line or tape measurer is 160 feet and the width of each increment was determined to be 16 feet, then the number of verticals required is 10. The sample station within each width increment is located at the center of the increment. In this example, the first sampling station would be at 8 feet from the bank nearest the initial point for width measurement. The verticals are then spaced 16 feet apart, resulting in sample stationing at 24, 40, 56, 72, ... and 152 feet of width.

3.1.5 If stream is < 5 feet wide, divide into as many equal increments as possible, with the minimum increment width being 3 inches.

3.2 Transit Rate

3.2.1 Determine the vertical increment that contributes the greatest flow to the stream channel (the fastest and deepest). Determine the mean vertical velocity using a current meter. The bronze D-77 operates at velocities up to 7.2 feet per second, and the aluminum D-77 to 3.3 feet per second.

3.2.2 Set up D-77 sampling unit at vertical determined from step 3.2.1 and lower unit until the bottle nozzle is just above the surface of the stream.

3.2.3 Using a stopwatch, determine the rate (cranks/second) and number of transits that it takes to fill the sampling bottle without overfilling. (A bottle is overfilled when the water surface in the bottle is above the nozzle or air exhaust with the sampler held level.) Several iterations will be required to determine the final transit rate, and this transit rate must be used at each vertical. It is possible to sample at two or more verticals using the same bottle if the bottle is not overfilled.

3.3 Sample Collection

3.3.1 Set up D-77 sampling unit (with crank and gauge) at first vertical station and lower until the bottle nozzle is just above the water surface and reset depth gauge to zero.

3.3.2 Using the transit rate determined in step 3.2.3, lower unit into stream and raise to surface once bottom is felt. The movement of the sampling unit throughout the water column must be constant with minimal disturbance of the stream bottom. Continue across stream to its far edge, depositing vertical samples into a composite sample container. Complete necessary transects, until desired volume is obtained. **Note: *An equal number of transits must be made at each vertical.***

4.0 STUDY-SPECIFIC DECISIONS

Study specific information should be included in the study protocol, a separate document describing a specific study.

5.0 REFERENCES

Standard Operating Procedure: ADMN002.00. 1996. Personnel organization and responsibilities for studies. California EPA, Department of Pesticide Regulation, Environmental Hazards Assessment Program. Sacramento, CA.